VISTAS IN ASTRONOMY

Volume 36

Edited by

P. BEER,

A. E. ROY,

and

R. E. WHITE

ARCHÆOASTRONOMY · ASTRONOMICAL EDUCATION · COMPUTER TECHNIQUES · GALAXIES · HISTORY AND PHILOSOPHY · INSTRUMENTATION · NEURAL NETWORKS · OPTICS · SOLAR ECLIPSES · SOLAR SYSTEM · SUBSTELLAR OBJECTS · VELOCITY OF LIGHT

PERGAMON

Editorial Board

Dr Sidney van den Bergh,
Dominion Astrophysical Observatory,
5071 W. Saanich Road,
Victoria, B.C.,
Canada V8X 3X3

Dr Sylvio Ferraz-Mello,
Instituto Astronomico e Geofisico
Universidade de São Paulo,
Caixa Postal 9638,
01065-970 São Paulo, Brazil

Professor Claude Foreschlé,
P. 229 F-06004,
Nice, Cedex 4,
France

Dr Mark S. Giampapa,
NSO/NOAO,
950 N. Cherry Ave/P.O. Box 26732,
Tucson, AZ 85726, U.S.A.

Professor André Heck,
Observatoire Astronomique de Strasbourg,
11 rue de l'Université,
F-67000, Strasbourg, France

Professor T. Kiang,
Dunsink Observatory,
Castleknock, Co. Dublin, Ireland

Dr Ludmila Kiseleva,
University of Cambridge,
Institute of Astronomy,
The Observatories,
Madingley Road,
Cambridge CB3 0HA, U.K.

Professor Y. Kozai,
Tokyo University,
Tokyo Astronomical Observatory,
Mitaka-Shi, Tokyo 181, Japan

Dr B. G. Marsden,
Smithsonian Astrophysical Observatory,
60 Garden Street,
Cambridge, MA 02138, U.S.A

Dr Stephen C. McCluskey,
Department of History,
University of West Virginia,
Morgantown, WV 26506, U.S.A.

Dr Paul Murdin,
Particle Physics and Astronomy
Research Council,
PO Box 18,
Swindon SW2 1ET, U.K.

Professor Donald E. Osterbrock,
Lick Observatory,
University of California,
Santa Cruz, CA 95064, U.S.A.

Professor Kenneth Pounds, FRS,
Particle Physics and Astronomy
Research Council,
PO Box 18,
Swindon SW2 1ET, U.K.

Professor Sir Martin Rees, FRS,
Institute of Astronomy,
Madingley Road,
Cambridge CB3 0HA, U.K.

Professor J. Sanz,
Depto Fisica Moderna,
University de Cantabria,
39005 Santander, Spain

Professor F. Graham Smith, FRS,
Nuffield Radio Astronomy Laboratories,
Jodrell Bank (University of Manchester),
Macclesfield, Cheshire, U.K.

Dr Serge Volonte,
ESA Directorate of Scientific Programme,
8–10 rue Mario-Nikis,
F-75738,
Paris Cedex 15, France

Dr G. Valsecchi,
Instituto Astrofisica, CNR,
Reparto Planetologia,
Viale dell'Universita 11,
00185 Rome, Italy

Dr Richard A. Wade,
Department of Astronomy and
Astrophysics,
525 Davey Laboratory,
Pennsylvania State University,
University Park, PA 16802, U.S.A.

Professor P. A. Wayman,
Dunsink Observatory,
Castleknock,
Co. Dublin, Ireland

Professor A. W. Wolfendale, FRS,
University of Durham,
Durham DH1 3LE, U.K.

Professor Michael Zeilik II,
Department of Physics and Astronomy,
University of New Mexico,
Albuquerque, NM 87131, U.S.A.

Professor Jöerg Waldvogel,
Seminar für Angewandte Mathematik,
ETH-Zentrum,
CH-8092 Zurich, Switzerland

Other Pergamon Titles of Interest

BIGNAMI & SUNYAEV: High-Energy Astrophysics and Cosmology
BITTENCOURT: Fundamentals of Plasma Physics
BOWLER: Lectures on Special Relativity
CLARK & STEPHENSON: The Historical Supernovae
DEMIANSKI: Relativistic Astrophysics
FLAUD: Water Vapour Line Parameters from Microwave to Medium Infrared
GINZBURG: Physics and Astrophysics (A Selection of Key Problems)
GURZADYAN: Flare Stars
HEY: The Radio Universe, 3rd Edition
JONES: The Solar System
KANDEL: Earth and Cosmos
KIVELSON: The Giant Planets and their Satellites
KONDRATYEV & HUNT: Weather and Climate on Planets
MEADOWS: Stellar Evolution, 2nd Edition
MELCHIOR: The Physics of the Earth's Core (An Introduction)
PAPADOPOULOS: True Visual Magnitude Photographic Star Atlas (3 vols)
SOLOMON & EDMUNDS: Giant Molecular Clouds in the Galaxy
WHYTE: The Planet Pluto

Related Journals of Interest (free specimen copy available on request)

Acta Astronautica
Advances in Space Research
Chinese Astronomy and Astrophysics
COSPAR Information Bulletin
Geochimica et Cosmochimica Acta
Journal of Atmospheric and Terrestrial Physics
Planetary and Space Science
Studies in History and Philosophy of Science

CONTENTS

Dynamics of Galaxy Groups: Computer Simulations Versus Observations 1

L. G. KISELEVA* and V. V. ORLOV†, **Institute of Astronomy, Cambridge CB3 0HA, U.K., †Astronomical Institute, St Petersburg State University, Bibliotchnaya pl. 2, St Petersburg Peterhof, 198904, Russia*

An Overview of Substellar Objects 31

C. R. CHAMBLISS, *Department of Physical Sciences, Kutztown University, Kutztown, PA 19530, U.S.A.*

An Occupation for an Independent Gentleman: Astronomy in the Life of John Herschel 71

A. CHAPMAN, *Wadham College, Oxford OX1 3PN, U.K.*

Astronomy of the Vedic Altars 117

S. C. KAK, *Department of Electrical and Computer Engineering, Louisiana State University, Baton Rouge, LA 70803-5901, U.S.A.*

A Review of Neural Network Applications in Astronomy 141

A. S. MILLER, *Astronomy and Space Physics Group, Physics Department, University of Southampton, Highfield, Southampton SO9 5NH, U.K.*

Databases: Between Old and New Astronomy 163

M. CRÉZÉ, *CDS, Observatoire de Strasbourg and CNRS, URA 1280, 11 rue de l'Université, F-67000 Strasbourg, France*

On the Origin of the Zodiacal Constellations 171

A. A. GURSHTEIN, *Research Group on Astronomy and Space, Institute for History of Science and Technology, Academy of Sciences of Russia, Moscow, Russia*

Number Systems: A Short History and a Suggestion for Future Progress 191

C. MARCHAL, *DES-ONERA, 92320 Chatillon, France*

Impact Craters: Lessons from and for the Earth 203

R. A. F. GRIEVE, *Geophysics Division, Geological Survey of Canada, Ottawa, Ontario K1A 0Y3, Canada*

The History of Astronomy in Queensland 231

R. D. HAYNES,* R. F. HAYNES† and W. S. KITSON‡, **School of English, University of New South Wales, PO Box 1, Kensington, NSW 2033, Australia, †Australia Telescope National Facility, CSIRO, PO Box 76, Epping, NSW 2121, Australia, ‡Division of Geographic Information, Queensland Department of Lands, PO Box 40, Woolloongabba, Qld 4102, Australia*

Toothed Wheels and Rotating Mirrors: Parisian Astronomy and Mid-Nineteenth Century Experimental Measurements of the Speed of Light 253

W. TOBIN, *Mount John University Observatory and Department of Physics and Astronomy, University of Canterbury, Private Bag 4800, Christchurch, New Zealand*

Isaac Watts and the Uses of a Knowledge of Astronomy: "He Taught the Art of Reasoning and the Science of the Stars" 295

G. P. BROOKS, *Department of Psychology, Saint Francis Xavier University, Antigonish, Nova Scotia B2G 1CO, Canada*

Astronomy and the Limits of Vision 311

B. E. SCHAEFER, *Universities Space Research Association, NASA/Goddard Space Flight Center, Code 661, Greenbelt, MD 20771, U.S.A.*

Perceived Night Length Ratios in Ancient Egypt 363

J. FERMOR, *Department of Language and Media, Glasgow Caledonian University, Cowcaddens Road, Glasgow G4 0BA, U.K.*

Effect of Dark Matter on the Dynamics and Coalescence in Galaxy Triplets 375

L. G. KISELEVA* and V. V. ORLOV†, **Institute of Astronomy, Madingley Road, Cambridge CB3 0HA, U.K.*, †*Astronomical Institute, St Petersburg State University 198904, St Petersburg, Petrodvorets, Russia*

Glasgow and the Heavens 389

A. E. ROY, *Department of Physics and Astronomy, Glasgow University, Glasgow, U.K.*

STRUCTURAL INDEX

Archaeoastronomy
Astronomy and the Limits of Vision 311
B. E. Schaefer

Astronomy of the Vedic Altars 117
S. C. Kak

Perceived Night Length Ratios in Ancient Egypt 363
J. Fermor

Astronomical Education
Astronomy and the Limits of Vision 311
B. E. Schaefer

Glasgow and the Heavens 389
A. E. Roy

Isaac Watts and the Uses of a Knowledge of Astronomy: "He Taught the Art of Reasoning and the Science of the Stars" 295
G. P. Brooks

Celestial Visibility
Astronomy and the Limits of Vision 311
B. E. Schaefer

Computer Techniques
Databases: Between Old and New Astronomy 163
M. Crézé

Dynamics of Galaxy Groups: Computer Simulations Versus Observations 1
L. G. Kiseleva and V. V. Orlov

A Review of Neural Network Applications in Astronomy 141
A. S. Miller

Dark Matter
Effect of Dark Matter on the Dynamics and Coalescence in Galaxy Triplets 375
L. G. Kiseleva and V. V. Orlov

Databases
Databases: Between Old and New Astronomy 163
M. Crézé

Galaxies
Dynamics of Galaxy Groups: Computer Simulations Versus Observations 1
L. G. Kiseleva and V. V. Orlov

Effect of Dark Matter on the Dynamics and Coalescence in Galaxy Triplets 375
L. G. Kiseleva and V. V. Orlov

Geophysics
Impact Craters: Lessons from and for the Earth 203
R. A. F. Grieve

History and Philosophy
An Occupation for an Independent Gentleman: Astronomy in the Life of John Herschel 71
A. Chapman

Astronomy of the Vedic Altars 117
S. C. Kak

Glasgow and the Heavens 389
A. E. Roy

Isaac Watts and the Uses of a Knowledge of Astronomy: "He Taught the Art of Reasoning and the Science of the Stars" 295
G. P. Brooks

Number Systems: A Short History and a Suggestion for Future Progress 191
C. Marchal

On the Origin of the Zodiacal Constellations 171
A. A. Gurshtein

Perceived Night Length Ratios in Ancient Egypt 363
J. Fermor

The History of Astronomy in Queensland 231
R. D. Haynes, R. F. Haynes and W. S. Kitson

Instrumentation
Toothed Wheels and Rotating Mirrors: Parisian Astronomy and Mid-Nineteenth Century Experimental Measurements of the Speed of Light 253
W. Tobin

Lunar Eclipses
Astronomy and the Limits of Vision 311
B. E. Schaefer

Meteorology
The History of Astronomy in Queensland 231
R. D. Haynes, R. F. Haynes and W. S. Kitson

Astronomy and the Limits of Vision 311
B. E. Schaefer

Neural Networks
A Review of Neural Network Applications in Astronomy 141
A. S. Miller

Number Systems
Number Systems: A Short History and a Suggestion for Future Progress 191
C. Marchal

Optics
Astronomy and the Limits of Vision 311
B. E. Schaefer

Solar Eclipses
Astronomy and the Limits of Vision 311
B. E. Schaefer

The History of Astronomy in Queensland 231
R. D. Haynes, R. F. Haynes and W. S. Kitson

Solar System
An Overview of Substellar Objects 31
C. R. Chambliss

Astronomy and the Limits of Vision 311
B. E. Schaefer

Impact Craters: Lessons from and for the Earth 203
R. A. F. Grieve

Substellar Objects
An Overview of Substellar Objects 31
C. R. Chambliss

Velocity of Light
Toothed Wheels and Rotating Mirrors: Parisian Astronomy and Mid-Nineteenth Century Experimental Measurements of the Speed of Light 253
W. Tobin

Zodiacal Constellations
On the Origin of the Zodiacal Constellations 171
A. A. Gurshtein

INDEX OF CONTRIBUTORS

Brooks, G. P. 295

Chambliss, C. R. 31
Chapman, A. 71
Crézé, M. 163

Fermor, J. 363

Grieve, R. A. F. 203
Gurshtein, A. A. 171

Haynes, R. D. 231
Haynes, R. F. 231

Kak, S. C. 117
Kiseleva, L. G. 1, 375
Kitson, W. S. 231

Marchal, C. 191
Miller, A. S. 141

Orlov, V. V. 1, 375

Roy, A. E. 389

Schaefer, B. E. 311

Tobin, W. 253

CONTENTS OF SOME PREVIOUS VOLUMES

Volume 27

The Cosmic Asymmetry in Matter-Antimatter—TONG BOR TANG and LI ZHI FANG. The Sedimentology of Mars: A Review—A. S. LEWIS. The Portraits of Edmond Halley—D. W. HUGHES. Erasmus Darwin's Contribution to Geophysics and Astronomy—D. KING HELE. Flare Stars—L. V. MIRZOYAN. Comet Dust—Applications of Mie Scattering—N. EATON. Some Observations of Martian Cloud Systems—G. E. HUNT and A. O. PICKERSGILL. Mass Transfer and Accretion in Close Binaries: A Review—C. B. BOYLE. The Origin of the Constellations—A. E. ROY. Cosmic Rays and Cosmology—N. C. RANA and A. W. WOLFENDALE. The Dynamics of the Minor Bodies in the Solar System—I. P. WILLIAMS. Megalithic Astronomy: The Last Five Years—C. L. N. RUGGLES. Observatory Chairs—C. STOTT. How Stars Form: A Synthesis of Modern Ideas—B. E. TURNER. The Influences of Planetary Environments on the Eruption Styles of Volcanoes—L. WILSON. Physical Properties of Comets—P. S. BUTTERWORTH. A Fibre-Optic Four-Channel Photometer—E. N. WALKER. New Results with the COSMOS Machine—H. T. MacGILLIVRAY and R. S. STOBIE.

Volume 28

Longitude Zero 1884–1984: Proceedings of an International Symposium held at the National Maritime Museum, Greenwich, London, 9–13 July 1984 to mark the centenary of the adoption of the Greenwich Meridian. The Observatories of the Canaries: On the Occasion of their Inauguration, June 28–29 1985. Editorial—Comet Halley 1985–86: Observations from Earth and Space—P. BEER. The Accuracy of Halley's Cometary Orbits—D. W. HUGHES. Arguments for an $\Omega = 1$, Low H_0, Baryon Dominated Universe—T. SHANKS. Kantian Epistemology as an Alternative to Heroic Astronomy—W. I. McLAUGHLIN.

Volume 29

The Disks of Spiral Galaxies—D. J. ADAMS. RR Lyrae Stars as Distance Indicators—R. F. JAMESON. Statistical Methods of Stellar Polarimetry—D. CLARKE and B. G. STEWART. The Origin of Comets—M. E. BAILEY, S. V. M. CLUBE and W. M. NAPIER. **Henry Rowland and Astronomical Spectroscopy: Celebration of the 100th Anniversary of Henry Rowland's Introduction of the Concave Diffraction Grating.** Star Names—Origins and Misconceptions—G. HEUTER. Polarimetry of Cool Giants and Supergiants—H. E. SCHWARZ. New Ideas in Cosmology and New Solutions in General Relativity—P.S. WESSON. A Large-Scale Atlas of the Milky Way Dark Clouds—J. V. FEITZINGER and J. A. STÜWE. An Analysis of the Light Changes of Eclipsing Variables in the Frequency-Domain: Practical Aspects—Z. KOPAL.

Volume 30

The Jack S. Josey Centennial Professorship Symposium in Honor of David S. Evans. Held at the University of Texas at Austin, 18–19 September 1986. Periodicities in the Sunspot Cycle—P. A. M. BERRY. Gravitational Wave Astronomy—Potential and Possible Realisation—J. HOUGH, B. J. MEERS, G. P. NEWSON, N. A. ROBERTSON, H. WARD, B. F. SCHUTZ, I. F. CORBETT and R. W. P. DREVER. The Extinction Properties of Saharan Dust Over La Palma—D. C. B. WHITTET, M. F. BODE and P. MURDIN. The Criteria for Cometary Remarkability—D. W. HUGHES. Foucault's Invention of the Silvered-Glass Reflecting Telescope and the History of His 80-cm Reflector at the Observatoire de Marseille—W. TOBIN. Road Lighting and Light Trespass—D. A. SCHREUDER. On the Baade-

Wesselink Method—A. GAUTSCHY. Large-Scale Filaments of Star Formation in the Large Magellanic Cloud—J. V. FEITZINGER, R. F. HAYNES, U. KLEIN, R. WIELEBINSKI and M. PERSCHKE. Celestial Mechanics After 300 Years. Why are Newton's Laws Laws and Why is this Question of Importance in Astrophysics?—R. C. JENNISON. The Effect of Air drag on Satellite Orbits: Advances in 1687 and 1987—D. G. KING-HELE and D. M. C. WALKER. The Theory of the Figure of the Earth According to Newton and Huygens—F. MIGNARD. Celestial Mechanics Since Newton—V. SZEBEHELY. The Analysis of Starlight: Some Comments on the Development of Stellar Spectroscopy, 1815–1965—J. B. HEARNSHAW.

Volume 31

Proceedings of the Fourth Asian-Pacific Regional Meeting of the International Astronomical Union—Edited by J. B. HEARNSHAW and ZHANG ERHE.

Volume 32

Chemical Processes in the Early Solar System: A Discussion of Meteorities and Astrophysical Models—D. W. G. SEARS. The General Three-Body Problem in Astrophysics—M. J. VALTONEN. From Research to Recreation: The Rise and Fall of Sydney Observatory— W. ORCHISTON. Portraits of William Herschell— A. J. TURNER. Project Longstop—A. E. ROY *et al.* Yale Contributions to Meteoric Astronomy—D. HOFFLEIT. Astro–Philately: Not so much a Hobby, More a Way of Life—MARGARET I. MORRIS. Reminiscences of Halley's Comet—D. W. HUGHES *et al.* The Pierce–Blitzstein Stellar Radiometric System—W. BLITZSTEIN. Centenary of the Royal Observatory, Edinburgh, 1888–1988—M. S. LONGAIR, H. A. BRÜCK, 29th Earl of Crawford and M. T. BRÜCK. Galactic Astronomy in Continental Europe in the Nineteenth Century in the Time Succeeding Herschel—KRISTEN ROHLFS. The Dust Rings of Uranus: A Picture is Worth a Million Words—C. D. MURRAY and R. P. THOMPSON. The Architecture of Astronomy in the British Isles: A General Study—R. I. MORTON-GLEDHILL. Illuminating Incidents in Antipodean Astronomy: Philip Parker King and the Founding of Sydney Observatory—W. ORCHISTON. Lightcurve Studies of Asteroids–CLAES-INGVAR LAGERKVIST. Broad Emission Lines in Active Galaxies—D. J. RAINE. William Lassell (1799–1880): Practitioner, Patron and "Grand Amateur" of Victorian Astronomy—A. CHAPMAN. The Piazzi Smyth Collection of Sketches, Photographs and Manuscripts at the Royal Observatory, Edinburgh—MARY T. BRÜCK.

Volume 33

Voyager 2's Encounter with Neptune—W. I. McLAUGHLIN. Search Techniques for Near-Earth Asteroids—E. F. HELIN and R. S. DUNBAR. George McVittie: His Breadth of Scientific Interest—S. K. RUNCORN. George Cunliffe McVittie (1904–88) OBE, FRSE. Pupil of Whittaker and Eddington:Pioneer of Modern Cosmology—SIR WILLIAM McCREA. War Work, 1940–1945—E. KNIGHTING. Brief Comments on George McVittie's Meterological Papers—R. HIDE. George McVittie's Work in Relativity—W. DAVIDSON. Building a Department of Astronomy—G. W. SWENSON. McVittie and the American Astronomical Society—D. E. OSTERBROCK, L. W. FREDRICK, F. K. EDMONDSON and MARTIN SCHWARZCHILD. George McVittie: Honorary Professor. University of Kent—R. CHISHOLM. Astronomical X-Ray Spectroscopy—Ten Years On—K. A. POUNDS. The Science Mission of the Hubble Space Telescope—E. J. CHAISSON and R. VILLARD. James Joule and Meteors—D. W. HUGHES. The Historical Instruments of Armagh Observatory—J. McFARLAND. The Star Makers: A History of the Theories of Stellar Structure and Evolution—T. ARNY. **Fractals in Astronomy (Proceedings of the XIIth Strasbourg Astronomical Day)**—Edited by ANDRE HECK.

Volume 34

J. Grigg, J. F. Skjellerup and Their Comet—DAVID W. HUGHES. Titan: Recent Developments—A. COUSTENIS. Ultraviolet Interstellar Polarization—W. B. SOMERVILLE. Very Long Baseline Interferometry: Current Status and Future Prospects—R. E. SPENCER. The Growth of Modern

Astronomy in India, 1651–1960—R. K. KOCHHAR. The Evolution of the Henry Draper Memorial—D. HOFFLEIT. Optical Polarization Studies of Astronomical Objects—S. M. SCARROTT. Additions and Corrections to the I. Hasegawa Catalogue—J. JANSEN. Galaxy Kinematics from ISIS Spectra—J. CASTLES, C. D. McKEITH and A. GREVE. High-Resolution Imaging in La Palma—R. M. REDFERN. The Magellanic Clouds: How Well do we Know What Our Closest Neighbours Are Made of?—S. RUSSELL. Stellar Mass Loss in Late B Type Supergiants—S. GILHEANY. EUV Emission from a Sample of Late-Type Stars Observed by the ROSAT Wide Field Camera—R. D. JEFFRIES, S. J. JEWELL, M. A. BARSTOW, G. E. BROMAGE, S. T. HODGKIN, K. O. MASON, L. MATTHEW, J. P. D. MITTAZ, J. P. PYE, J. J. QUENBY, S. R. ROSEN and S. D. SIDHER. Comparison of Solar and Stellar Flare Ultraviolet Continua—K. J. H. PHILLIPS, G. E. BROMAGE and J. G. DOYLE. The EUV Background, the Intersetellar Medium, and ROSAT—H. J. WALKER, A. W. HARRIS, T. J. SUMNER, G. C. BREBNER, M. A. BARSTOW and R. WILLINGALE. Studies of Active Chromosphere Stars at Monash University—G. J. ANDERS, D. W. COATES and K. THOMPSON. The Solar-Stellar Connection—Polarimetry—D. CLARKE. The Effects of Magnetic Geometry on Electron Confinement in Solar Flares—K. G. McCLEMENTS. Solar Flare Proton Acceleration by Alfven Turbulence—A. L. MacKINNON. First Results from the ROSAT Wide Field Camera Source Identification Programme—K. O. MASON, G. BRANDUARDI-RAYMONT, G. E. BROMAGE, D. BUCKLEY, P. A. CHARLES, B. J. M. HASSALL, M. R. S. HAWKINS, S. HODGKIN, C. D. PIKE, C. M. JOMARON, D. H. P. JONES, I. McHARDY, T. T. NAYLOR, T. J. PONMAN and M. G. WATSON. Solar Flares: A Review—K. J. H. PHILLIPS. Church State and Astronomy in Ireland: 200 Years of Armagh Observatory (by J. A. Bennett)—P. BEER. Solar Sailing: A New Tool for Solar System Research—C. R. McINNES. Nineteenth Century Investigations of Periodicities in the Jovian Atmosphere—T. A. HOCKEY. The Hubble-Van Maanen Conflict over Inernal Motions in Spiral Nebulæ: Yet More New Information on an Already Old Topic—R. W. BRASHEAR and N. S. HETHERINGTON. The Herschel–Denning Correspondence: 1871–1900—M. BEECH. Book Reviews.

Volume 35

Photographing the Solar Eclipse of 11 July 1991, La Paz, Mexico—F. DIEGO. The 1991 Eclipse: "Telling it Like it is"—P. BEER. The 11 July 1991 Eclipse: The View from Hawaii—N. HENBEST. All at Sea . . . The Eclipse 'n Me—R. E. WHITE. From The Hubble Expansion to Higher Dimensions A Review of Modern Cosmology—D. ALEXANDER. Sunspots, Planetary Alignments and Solar Magnetism: A Progress Review—P. A. SEYMOUR, M. WILLMOTT and A. TURNER. The Process of Discovery: Supernovae, Comets, and Extraterrestrial Life—R. F. GARRISON. Lord Crawford's Observatory at Dun Echt 1872–1892—H. A. BRÜCK. On the Future of Existing Photometric Systems—C. STERKEN. Doppler and Vogel—Two Notable Anniversaries in Stellar Astronomy—J. B. HEARNSHAW. The Creation of Free Energy—R. A. ALPHER and G. MARX. Electronic Publishing and 'Intelligent' Information Retrieval in Astronomy and Space Sciences—A. HECK. Recent Developments in Analysing Redshift Surveys of Galaxies—M. A. HENDRY. On the Impact of an Ultimate Metrological Reform in Astronomical Photometry—C. STERKEN. The Nazca Geoglyphs—An Astronomical (?) Mystery—S. VAN DEN BERGH. From Newton to Chaos and Modern Physics—I—Y. C. GE. The Contribution of Francis Abbott to Tasmanian and Australian Astronomy—W. ORCHISTON. Mirror Images—G. M. SISSON. Robots in Astronomy—J. E. F. BARUCH. Constraints on Dark Matter from Intergalactic Radiation—J. M. OVERDUIN and P. S. WESSON.